GSIR WORKING PAPERS

Economic Development & Policy Series EDP06-1

Inter-sectoral Interdependence and Growth in Vietnam: A Comparative Analysis with Indonesia and Malaysia

Takahiro Akita
International University of Japan

and

Chu Thi Trung Hau
Asian Development Bank, Vietnam

January 2006

Graduate School of International Relations
International University of Japan

http://gsir.iuj.ac.jp/

GSIR Working Papers
Economic Development & Policy Series EDP06-1

Inter-sectoral Interdependence and Growth in Vietnam: A Comparative Analysis with Indonesia and Malaysia*

Takahiro Akita
Professor of International Development, Graduate School of International Relations, International University of Japan

and

Chu Thi Trung Hau
Economics Researcher, Japan Fund for Public Policy Training, Asian Development Bank, Vietnam

Abstract

This study examines the sources of output growth in Vietnam during 1996-2000 using the national input-output (I-O) tables. It employs an extended growth-factor decomposition method, which is an extension of the standard growth-factor decomposition method, in which all industries are classified into the primary, secondary and tertiary sectors. It also conducts a comparative analysis of Vietnam, Indonesia and Malaysia. The major source of Vietnam's output growth was the expansion of exports. The secondary sector played a key role in Vietnam's output growth, as its demand effects induced more than half of total output growth, contributing not only to the output growth of the sector itself but also of the other two sectors through inter-industry linkages. Malaysia's growth pattern was similar to Vietnam's, in which export expansion was the main driver of growth and the secondary sector led output growth. However, heavy industries played a more important role than light industries in Malaysia. Indonesia exhibits a markedly different growth pattern than Vietnam and Malaysia, as its tertiary sector was a more important driver of economic growth.

Keywords: Interdependence, Output Growth, Structural Changes, Vietnam, Input-Output Analysis

JEL classification: O14, O53

* The authors would like to thank Mohd Zahid Abdullah for providing Malaysian input-output tables for 1987 and 1991.

Inter-sectoral Interdependence and Growth in Vietnam: A Comparative Analysis with Indonesia and Malaysia

Takahiro Akita
Professor of International Development, Graduate School of International Relations, International University of Japan

and

Chu Thi Trung Hau
Economics Researcher, Japan Fund for Public Policy Training, Asian Development Bank, Vietnam

1. Introduction

The Vietnamese economy's achievements in the 1990s are unambiguously impressive. Due to a comprehensive market-oriented reform program known as *doi moi* (renovation) introduced in 1986, the Vietnamese government managed to transform an economy characterized by highly centralized planning, stagnation, and macroeconomic instability in the mid-1980s to a mixed economy with reasonably stable prices and strong growth a decade later. GDP grew at an average annual rate of over 8% between 1990 and 1997. Exports expanded more quickly, in both volume and variety, and inflows of foreign goods, technology, and investment capital played an important role in the modernization of the economy (Kokko, 1998). While all sectors contributed to the overall growth, the industrial sector[1] was the main driver of GDP growth, as it expanded at an average annual rate of 13-14% from 1993-1997.

At the 8th Party Congress in 1996, the Vietnamese government set an ambitious objective of accelerating economic modernization and industrialization so that the Vietnamese economy will undergo structural change through sustained high growth rates in industrial production for the next two decades.

Because almost a decade has passed since that ambitious objective was set and only 15 years are left for the Vietnamese economy to become fully industrialized by 2020, this study examines the Vietnamese economy's progress and assesses whether it is on track to becoming fully industrialized. The two most important

[1] While the industry sector includes manufacturing, mining, and construction, it mainly refers to manufacturing activities especially when industrialization is concerned.

aspects that need to be considered are structural changes and the sources of output growth. Clearly, structural changes in the form of a shift away from agriculture towards industry will be required if the economy is to become industrialized. Furthermore, the sources of industrial output growth must be strengthened and diversified if the industrial sector is to sustain a high growth rate and to expand its share in the economy.

The literature on the Vietnamese economy until now has tended to focus on the supply response to reform policies. Most studies have examined overall economic growth and have attempted to interpret and explain the key factors driving the economy's growth performance at the macro-level[2]. Structural changes have been discussed on an ad hoc basis but have not been the exclusive focus of any previous study. A descriptive analysis of the Vietnamese economy's growth and structure from 1975-1998 by Vo (2000) found a definite shift of the economy from agriculture towards non-agricultural sectors. Tarp *et al.* (2002) used the social accounting matrix for Vietnam in 2000 to examine the structure of the economy at that particular point in time.

There have been several studies on industrial development. Le and Tran (1999) discussed the accomplishments and difficulties of Vietnam's industrial sector from 1986-1999. They provided an overview of the industrial sector's growth and the contributing domestic and external factors during this period. Vo's study (2002) covered a similar period though it focused on the growth of each industry.

The interactions between the three sectors of an economy (the primary, secondary, and tertiary sectors[3]) play an important role in the output growth of each industry, which should also be considered in analyzing the process of industrialization. Theory and empirical evidence suggest strong dynamic interactions among these three sectors. Expansion in one sector is expected to have some effect on the growth of the other two sectors. However, the extent to which the growth of each sector can stimulate growth in the other two varies from sector to sector and

[2] See, for example, van Arkadie and Mallon (2003) and Dodsworth *et al.* (1996)

[3] The primary sector includes agriculture and mining. The secondary sector refers to all manufacturing industries and is thus interchangeable with "the manufacturing sector". The tertiary sector consists of all services activities, including construction. Therefore, the secondary sector in this paper differs from the industrial sector. A detailed sector classification is given in table 3.1.

depends on the structure of the economy. As the Vietnamese government pursues industrialization and the secondary sector increases in relative importance, it is imperative to examine the expected impact of such structural changes on the output growth of each industry as well as the overall growth of the economy.

The economic transformation and growth in Vietnam can also be usefully compared with that of the dynamic ASEAN countries (DACs), which here refer to Indonesia, Malaysia, the Philippines, Singapore, and Thailand. Since adopting *doi moi*, the Vietnamese government has shown strong interest in the economic policies and experiences of the DACs. The Vietnamese government's goals of rapid industrialization and high economic growth are similar to the principal economic objectives of the DACs (Gates, 2000). However, Vietnam is comparatively a latecomer to the industrialization process among ASEAN countries, and thus, its policymakers can learn from the successes and failures of the DACs.

This study examines the sources of output growth in Vietnam during 1996-2000 using the 1996 and 2000 national input-output (I-O) tables. It employs an extended growth-factor decomposition method, which is an extension of the standard growth-factor decomposition method, developed by Chenery and Syrquin (1979) and used by many researchers. In the extended method, all industries in the I-O tables are classified into the three sectors: the primary, secondary and tertiary sectors. The method is able to analyze the effects of the interdependence between the three sectors on the output growth of each industry in a coherent framework. This study adds to the existing body of knowledge on Vietnam's economic development as it is the first sources of growth analysis based on Vietnam's I-O tables.

In addition, this study conducts a comparative analysis on Vietnam from 1996-2000, Indonesia from 1990-1995 and Malaysia from 1987-1991. These periods are chosen due to the availability of the national I-O tables in the selected countries. Both Indonesia and Malaysia in their respective periods were far more industrialized than Vietnam. Both had also undergone the different phases of structural changes and industrial growth. This study compares Vietnam's industrial structure and sources of output growth with those of Indonesia and Malaysia in the specified periods. The comparative analysis elucidates useful implications of the development process for Vietnam.

This paper consists of six sections. Section 2 provides an overview of Vietnam's economic development and policy direction from 1986-1995 and discusses important industrial and trade policies during the study period from 1996-2000. Section 3 explains the growth factor decomposition methods employed in this study. Section 4 presents the findings on structural changes and the results of the standard as well as extended growth factor decomposition analyses in Vietnam from 1996-2000. Section 5 conducts a comparative analysis of Vietnam from 1996-2000, Indonesia from 1990-1995 and Malaysia from 1987-1991. Lastly, section 6 presents the major findings and policy implications.

2. Economic Development and Policy Direction in Vietnam

Vietnam's industrialization can be considered as beginning in 1975 when the country was reunited. At that early stage, the main priority was given to the development of heavy industries (Riedel and Comer, 1997). From 1975-1986, Vietnam's economy was characterized as a highly centrally-planned economy with the State assuming the dominant role. External economic relations were mainly with the socialist Eastern European countries, especially the former Soviet Union. During this period, the economy faced many problems, and its GDP grew very slowly (Pham, 2004). The industrialization process, however, truly commenced only in 1986 when, at the watershed sixth Communist Party Congress, the leadership made a decision to change course and transform Vietnam into a market-based economy. Section 2.1 reviews the economic development and policy direction from 1986-1995. Section 2.2 discusses industrial and trade policies during the study period from 1996-2000.

2.1 Economic Development and Policy Direction in Vietnam, 1986-1995

The period from 1986-1995 most closely corresponds to two Five-Year Socio-Economic Development Plans, which were adopted at the sixth and seventh Communist Party Congresses in 1986 and 1991, respectively. The 1986 Five-Year Plan adopted the promotion of consumer goods and export-oriented industries. Among heavy industries, priority was given to those industries that could supply important industrial inputs. The subsequent Five Year Plan (1991) continued to emphasize all the objectives and priorities of the 1986 Plan while also emphasizing

the need to develop food-processing industries in order to increase exports of processed agricultural products. Furthermore, the 1991 Plan promoted exports of consumer goods as well as assembled electronics and machinery.

However, it was the introduction of a broad economic reform program known as "*doi moi*" (renovation) in 1986 that marked a turning-point in the government's economic policy. In addition to *doi moi*, the Vietnamese government adopted an open door policy, which reduced and removed tariff and non-tariff barriers to international trade, thus promoting external economic cooperation and international trade with non-socialist countries while also encouraging foreign direct investment from them. On balance, due to a deliberate policy of export expansion and diversification, trade liberalization proceeded more rapidly for exports than for imports. However, several export restrictions remained in effect and tended to provide unfair advantages to state-owned enterprises (SOEs). Most remaining export bans and quotas were eased gradually but were not entirely eliminated even by the early 1990s (IMF, 1998).

The liberalization of import restrictions was more modest. The government still nurtured selected domestic industries through trade protection, especially those industries dominated by SOEs. The tariff structure was complex, and the tariff rates and coverage were frequently adjusted in response to the perceived short-term needs of specific industries. Non-tariff barriers such as quantitative import controls and temporary import bans were applied from time to time depending on the market situation (IMF, 1998).

In 1987, the Law on Foreign Investment was promulgated in an effort to attract foreign capital and technology to support the country's socio-economic development. A shift in focus of investment from heavy industries toward light, export-oriented industries was the intent of this law (Pham, 2004). SOEs were given more autonomy and made responsible for their own production, marketing and profits. The government sought to promote the private sector while at the same time eliminating the system of government subsidies for SOEs (Pham, 2004).

As these reforms came into effect, the economy achieved encouraging initial results. The annual GDP growth rate increased gradually from 2.8% in 1986 to 7.4% in 1989. After slightly slowing down in 1990-1991, GDP grew at a sustained rate

above 8% from 1992-1995. Exports increased rapidly from a tiny share of GDP (3.9%) in 1988 to a third of GDP in the mid-1990s. The agricultural sector was declining in relative importance in the economy. Its share of GDP decreased from 43.8% in 1986 to 38.7% in 1990 and further dropped to 28.7% in 1994. Service activities expanded rapidly along with the increasing role of the private sector in the economy.

The manufacturing sector, dominated by SOEs, was initially not able to expand at a high rate. It faced many difficulties from 1986-1990 as the supply of industrial inputs from the Council for Mutual Economic Assistance (CMEA) was cut off, markets in the CMEA area were lost, and subsidies to SOEs were eliminated. The share in GDP of the industrial sector, including manufacturing, mining, and construction, declined from 25.7% in 1986 to 22.7% in 1990. After these gloomy years, industrial enterprises started to find ways to overcome these difficulties and took advantage of the *doi moi* reforms. Industrial production started to recover its share in GDP in the subsequent years and eventually comprised 29.6% of GDP by 1994.

Within the industrial sector, heavy industries gained in relative importance at the expense of light industries. The share of heavy industries in total industrial output increased from 31.4% in 1985 to 42.1% in 1992. This was mainly due to the fact that the oil industry and several large power and cement factories finally came on-stream. Several light industries, however, had difficulties in finding markets and adapting to the new mechanisms brought about by *doi moi* (CIEM, 1994).

While the industrial sector increased its GDP contribution, it failed to absorb an equivalent share of labor. It was the agricultural sector that played the most important role in providing additional employment. Only a fifth of the new labor force each year joined the industrial sector (Bui, 1994). In the 1990s, the industrial sector's share of total labor remained relatively stable at around 13%, and the manufacturing sector comprised only 9% of the total labor force (Vo, 2000).

2.2 Industrial and Trade Policies, 1996-2000

The overarching policy direction for the study period 1996-2000 was provided by the Five-Year Socio-Economic Development Plan for 1996-2000, which

was approved by the 8th Party Congress and the 9th National Assembly in 1996. The main objective was to accelerate modernization and industrialization such that Vietnam would become industrialized by 2020. This objective included the creation of a more dynamic and efficient industrial sector by developing the key industries in which Vietnam has comparative advantages. The plan also provided direction for the economy to continue its structural shift from agriculture toward manufacturing and services.

The main part of the 1996-2000 Plan set an industrialization strategy for Vietnam that emphasized the following groups of industries:

(1) Export-oriented industries, which are intensive in cheap labor, such as the food processing, garment, leather product, and electronic machinery industries.;
(2) Supporting industries, which could help promote the development of other industries, especially export-oriented ones;
(3) New industries such as the machinery and electronic machinery industries and the chemical and petrochemical industries, which were expected to facilitate the development of new comparative advantages in the future.

Vietnam's industrialization strategy for this period is considered a dual strategy, promoting at the same time both export-oriented and infant import-substitution industries (Pham, 2004). Export promotion and import substitution were considered to be complementary rather than alternative policies. Selective import substitution was expected to develop local manufacturing capacity to support exporting activities. This industrialization strategy seemed, however, to give priority to export promotion. It called for the need to diversify export products, strengthen the competitiveness of these products, and promote a shift away from exports of unprocessed or semi-processed agricultural products towards exports of manufactured goods. While overall import restrictions were considered necessary to reduce the trade deficit, priorities were given to imports of inputs used for exporting activities.

In line with this strategy, a series of policies were introduced in the study period of 1996-2000 that were aimed at liberalizing trade, especially exports. Export restrictions were relaxed when the Prime Minister's Decision in 1997 prefigured further liberalization that eventually allowed licensed exporters to export any and all

items. The decision also empowered producers of all non-regulated export goods to export directly rather than through a trading company. This in effect helped break the existing export business cartel. All these policy changes came into full effect in 1998 (CIE, 1999).

International trade was further liberalized in July 1998 when a decree allowed all legally-established local enterprises to export and import goods that are consistent with the field of businesses specified in their business license. In addition, all registered enterprises, including both locally- and foreign-owned, can even export items that are not explicitly listed in their licenses, providing that they notify the authority of the new products they wish to export and obtain a customs code. The export licensing system was replaced by a requirement to register with the Department of Customs at provincial or municipal levels (CIE, 1999). These policy measures improved transparency and expanded access to exporters and importers.

Additional steps were taken in 1998 and 1999 to further liberalize and promote exports. Export taxes on several products, including rice, were eliminated. Auctioning of garment export quotas was introduced. Private firms were permitted to export rice under certain conditions. These steps effectively granted the private sector access to export quotas of garments and rice, which had previously been mainly allocated to state enterprises (WB, 1999).

On the other hand, various import restrictions were maintained to protect selective domestic industries and to avoid a balance of payment crisis when necessary. Although tariffs were decreased, they remained wide in coverage and high in level. The maximum tariff rate was 80% in 1996, which was later reduced to 60% in 1998. At the same time, a special sales tax was imposed on imported (but not locally produced) motor vehicles, which practically negated the impact of the tariff reduction (CIE, 1999). In addition, protection was effectively increased due to the use of government reference prices for import valuation purposes (IMF, 1998).

Import quotas remained in effect for five groups of commodities in 1996 – cement, petroleum products, fertilizers, sugar, and steel – and were extended to construction glass and paper products in 1997. Such quantitative import controls were designed to balance demand and supply in the domestic market and nurture domestic producers (IMF, 1998).

Import restrictions were tightened during 1997-1999 in response to a decline in export growth and FDI inflows as a result of the Asian financial crisis. The government decided to restrict imports of non-essential goods so as to allocate scarce foreign exchange to industries that relied heavily on imported inputs. In 1997, temporary import bans were introduced for a number of commodities with large domestic stocks including, *inter alia*, sugar, beverages, paper, cement, steel, automobiles, and motorcycles, (IMF, 1998). While the temporary import ban on alcoholic beverages was removed in 1998, the ban on sugar, beverages, paper, cement, steel, automobiles, and motorcycles was extended.

The government recognized the important role of foreign direct investment (FDI) in accelerating the industrialization process. FDI was expected to bring in necessary investment capital, foreign exchange, and modern technology. A number of government policies were designed to attract FDI flows into target industries. The Law on Foreign Investment, promulgated in 1987, was renewed twice in 1996 and 2000 to create a more favorable environment for FDI and broaden the rights of foreign investors. In 1995, the U.S. trade embargo against Vietnam was lifted, boosting the inflows of FDI. From 1997-1998, however, as a consequence of the Asian financial crisis, a series of regional local currencies were devalued, weakening Vietnam's comparative advantage of cheap labor and reducing its attractiveness accordingly (Pham, 2004).

3. Method and the Data

3.1. Method

There have been many studies on the sources of output growth based on an I-O framework, in which I-O structures between two periods are compared to identify the sources of output growth in a comparative static framework. Most of them used the same decomposition technique developed by Chenery and Syrquin (1979) and examined the pattern of economic development in relation to development strategies. Among these studies were Akita (1991), Akita and Hermawan (2000), Chenery (1980, 1986), James and Fujita (1989, 1997), Martin and Holland (1992), Urata (1987), Zakariah and Elameer (1999).

Considering the dynamic interactions between the three basic sectors of the economy – the primary, secondary, and tertiary sectors – this study developed an extended growth factor decomposition method as an extension of the standard growth factor decomposition method, as developed by Chenery and Syrquin. In the extended method, all industries in the I-O tables are classified into these three sectors. The extended method takes into account the role of interdependence between the three sectors while examining the sources of output growth of each industry. It is able to analyze the effects of the interdependence between the three sectors on the output growth of each industry in a coherent framework. It can explicitly identify growth factors that originate from within the sector, to which a particular industry belongs, as well as those that come from the other two sectors.

Standard Growth Factor Decomposition Method

The growth-factor decomposition method used in this study is based on the following supply-demand balance equation for the national I-O accounts:

$$\mathbf{X} = \mathbf{W} + \mathbf{D} + \mathbf{E} - \mathbf{M}, \quad (1)$$

where **X**, **W**, **D**, **E**, and **M** are vectors of gross output, domestic intermediate demand, domestic final demand, exports, and imports, respectively. Each element of the vectors designates an industrial sector of the economy.

If we let $\mathbf{W} = \mathbf{AX}$ and $\mathbf{M} = \hat{\mathbf{m}}(\mathbf{W} + \mathbf{D})$, where **A** is a matrix of technical coefficients and $\hat{\mathbf{m}}$ is a diagonal matrix of import ratios (= import/total domestic demand), then we can rewrite equation (1) as

$$\mathbf{X} = \hat{\mathbf{p}}(\mathbf{AX} + \mathbf{D}) + \mathbf{E} \quad (2)$$

where $\hat{\mathbf{p}}$ is a diagonal matrix of domestic supply ratios ($= \mathbf{I} - \hat{\mathbf{m}}$).

Solving equation (2) for **X**, we obtain gross domestic outputs necessary to satisfy a specific level of domestic final demand and exports:

$$\mathbf{X} = \mathbf{B}(\hat{\mathbf{p}}\mathbf{D} + \mathbf{E}) \quad (3)$$

where $\mathbf{B} = (\mathbf{I} - \hat{\mathbf{p}}\mathbf{A})^{-1}$ is termed the domestic Leontief inverse.

Equation (3) can be used to solve for the change in gross outputs, $\Delta\mathbf{X} = \mathbf{X}_t - \mathbf{X}_0$, in terms of changes in domestic and export demands and changes in the two structural parameters, $\hat{\mathbf{p}}$ and **A**:

$$\Delta \mathbf{X} = \mathbf{B}_t(\hat{\mathbf{p}}_t \mathbf{D}_t + \mathbf{E}_t) - \mathbf{B}_0(\hat{\mathbf{p}}_0 \mathbf{D}_0 + \mathbf{E}_0) \quad (4)$$

where subscripts 0 and t designate the base year and the terminal year, respectively, while Δ denotes a change over the period.

After some matrix manipulations, equation (4) is reduced to

$$\Delta \mathbf{X} = \mathbf{B}_t[\hat{\mathbf{p}}_t \Delta \mathbf{D} + \Delta \mathbf{E} + \Delta \hat{\mathbf{p}}(\mathbf{A}_0 \mathbf{X}_0 + \mathbf{D}_0) + \hat{\mathbf{p}}_t \Delta \mathbf{A} \mathbf{X}_0] \quad (5)$$

This is the standard growth factor decomposition equation proposed by Chenery and Syrquin (1979).

The growth-factor decomposition equation (5) is obtained by using the terminal year structural parameters, $\hat{\mathbf{p}}_t$ and $\mathbf{B}_t$, and the base year volume weights, $\mathbf{X}_0$ and $\mathbf{D}_0$. However, we can also obtain a decomposition equation based on the base year structural parameters, $\hat{\mathbf{p}}_0$ and $\mathbf{B}_0$, and the terminal year volume weights, $\mathbf{X}_t$ and $\mathbf{D}_t$ as follows:

$$\Delta \mathbf{X} = \mathbf{B}_0[\hat{\mathbf{p}}_0 \Delta \mathbf{D} + \Delta \mathbf{E} + \Delta \hat{\mathbf{p}}(\mathbf{A}_t \mathbf{X}_t + \mathbf{D}_t) + \hat{\mathbf{p}}_0 \Delta \mathbf{A} \mathbf{X}_t] \quad (6)$$

To solve an index number problem presented in (5) and (6), in this study we use the simple average of these two equations (5) and (6).

In sum, the change in the gross output is decomposed into the following four major factors:

(a) Effect of the expansion of domestic final demand (DD);
(b) Effect of export expansion (EE);
(c) Effect of the changes in import ratios (domestic supply ratios) or import substitution (IS);
(d) Effect of the changes in technical coefficients (IO).

Output growth due to the expansion of domestic final demand (DD) can be further decomposed into four components in terms of domestic final demand sectors: household consumption expenditure (DD1); government consumption expenditure (DD2); capital formation (DD3); and changes in inventory (DD4). Thus, equations (5) and (6) can be written as:

$$\Delta \mathbf{X} = (\mathrm{DD1} + \mathrm{DD2} + \mathrm{DD3} + \mathrm{DD4}) + \mathrm{EE} + \mathrm{IS} + \mathrm{IO}. \quad (7)$$

Extended Growth-Factor Decomposition Equation in a Three-Sector Economy

Now, we consider an economy whose industries are classified into the three sectors: the primary (P), secondary (S), and tertiary (T) sectors. Then the domestic Leontief inverse is thought to be composed of nine sub-matrices. That is,

$$\mathbf{B}_t = \begin{bmatrix} \mathbf{B}_t^{PP} & \mathbf{B}_t^{PS} & \mathbf{B}_t^{PT} \\ \mathbf{B}_t^{SP} & \mathbf{B}_t^{SS} & \mathbf{B}_t^{ST} \\ \mathbf{B}_t^{TP} & \mathbf{B}_t^{TS} & \mathbf{B}_t^{TT} \end{bmatrix}.$$

Then equation (5) can be rewritten as:

$$\begin{bmatrix} \Delta\mathbf{X}^P \\ \Delta\mathbf{X}^S \\ \Delta\mathbf{X}^T \end{bmatrix} = \begin{bmatrix} \mathbf{B}_t^{PP} & \mathbf{B}_t^{PS} & \mathbf{B}_t^{PT} \\ \mathbf{B}_t^{SP} & \mathbf{B}_t^{SS} & \mathbf{B}_t^{ST} \\ \mathbf{B}_t^{TP} & \mathbf{B}_t^{TS} & \mathbf{B}_t^{TT} \end{bmatrix} \left(\begin{bmatrix} \hat{\mathbf{p}}_t^P \Delta\mathbf{D}^P \\ \hat{\mathbf{p}}_t^S \Delta\mathbf{D}^S \\ \hat{\mathbf{p}}_t^T \Delta\mathbf{D}^T \end{bmatrix} + \begin{bmatrix} \Delta\mathbf{E}^P \\ \Delta\mathbf{E}^S \\ \Delta\mathbf{E}^T \end{bmatrix} + \begin{bmatrix} \Delta\mathbf{p}^P \left(\sum_L \mathbf{A}_0^{PL}\mathbf{X}_0^L + \mathbf{D}_0^P \right) \\ \Delta\mathbf{p}^S \left(\sum_L \mathbf{A}_0^{SL}\mathbf{X}_0^L + \mathbf{D}_0^S \right) \\ \Delta\mathbf{p}^T \left(\sum_L \mathbf{A}_0^{TL}\mathbf{X}_0^L + \mathbf{D}_0^T \right) \end{bmatrix} + \begin{bmatrix} \hat{\mathbf{p}}_t^P \sum_L \Delta\mathbf{A}^{PL}\mathbf{X}_0^L \\ \hat{\mathbf{p}}_t^S \sum_L \Delta\mathbf{A}^{SL}\mathbf{X}_0^L \\ \hat{\mathbf{p}}_t^T \sum_L \Delta\mathbf{A}^{TL}\mathbf{X}_0^L \end{bmatrix} \right) \tag{8}$$

Therefore, by expanding this equation, we obtain the growth-factor decomposition equation for each industry in each sector. For example, the equation for the secondary sector is given by:

$$\begin{aligned} \Delta\mathbf{X}^S = {} & \mathbf{B}_t^{SS} \left(\hat{\mathbf{p}}_t^S \Delta\mathbf{D}^S + \Delta\mathbf{E}^S + \Delta\hat{\mathbf{p}}^S \left(\sum_L \mathbf{A}_0^{SL}\mathbf{X}_0^L + \mathbf{D}_0^S \right) + \hat{\mathbf{P}}_t^S \sum_L \Delta\mathbf{A}^{SL}\mathbf{X}_0^L \right) \\ & + \mathbf{B}_t^{SP} \left(\hat{\mathbf{p}}_t^P \Delta\mathbf{D}^P + \Delta\mathbf{E}^P + \Delta\hat{\mathbf{p}}^P \left(\sum_L \mathbf{A}_0^{PL}\mathbf{X}_0^L + \mathbf{D}_0^P \right) + \hat{\mathbf{P}}_t^P \sum_L \Delta\mathbf{A}^{PL}\mathbf{X}_0^L \right) \\ & + \mathbf{B}_t^{ST} \left(\hat{\mathbf{p}}_t^T \Delta\mathbf{D}^T + \Delta\mathbf{E}^T + \Delta\hat{\mathbf{p}}^T \left(\sum_L \mathbf{A}_0^{TL}\mathbf{X}_0^L + \mathbf{D}_0^T \right) + \hat{\mathbf{P}}_t^T \sum_L \Delta\mathbf{A}^{TL}\mathbf{X}_0^L \right) \end{aligned} \tag{9}$$

We can then identify the following six major factors for the output growth of an industry in the secondary sector:

(a) Effect of the expansion of domestic final demand within the secondary sector, or the total effects on output of each industry within the secondary sector of the expansion of domestic final demand in secondary industries ($\mathbf{B}_t^{SS}\ \hat{\mathbf{p}}_t^S \Delta\mathbf{D}^S$);

(b) Effect of export expansion within the secondary sector, or the total effect on output of each industry within the secondary sector of the expansion of exports in secondary industries ($\mathbf{B}_t^{SS}\ \Delta\mathbf{E}^S$);

(c) Effect of the changes in import ratios (or domestic supply ratios) within the secondary sector, or the total effect on the output of each industry within the secondary sector of the changes in import ratios (or domestic supply ratios) in secondary industries ($\mathbf{B}_t^{SS}\ \Delta\mathbf{p}^S\left(\sum_L \mathbf{A}_0^{SL}\mathbf{X}_0^L + \mathbf{D}_0^S\right)$);

(d) Effect of the changes in technical coefficients, or the total effect on output of each industry within the secondary sector of the changes in technical coefficients associated with the secondary sector ($\mathbf{B}_t^{SS}\ \hat{\mathbf{P}}_t^S \sum_L \Delta\mathbf{A}^{SL}\mathbf{X}_0^L$);

(e) Total effect on output of each industry within the secondary sector due to the changes in the demands for the primary sector (the terms with $\mathbf{B}_t^{SP}$ in equation (9)); and

(f) Total effect on output of each industry within the secondary sector due to the changes in the demands for the tertiary sector (the terms with $\mathbf{B}_t^{ST}$ in equation (9)).

We can similarly obtain the extended growth-factor decomposition equations for the primary and tertiary sectors. The sum of (a), (b), (c), and (d) above is the total effect on the output of each industry within the secondary sector due to the changes in the demands for the secondary sector (the terms with $\mathbf{B}_t^{SS}$ in equation (9)), which can be termed within-sector demand effects. It should be noted that in the same way as the standard decomposition equation, we can obtain an extended decomposition equation based on the base year structural parameters and the terminal year volume weights. Therefore, we also use the simple average of the two equations in the extended decomposition analysis.

3.2. The Data

The Vietnam General Statistics Office (Vietnam GSO) compiled three national competitive-import type Input-Output (I-O) tables for 1989, 1996 and 2000 based on producers' prices (Vietnam GSO, 1999, 2003). The first table is, however, very rudimentary, and the 1996 and 2000 tables were used for the growth factor decomposition analyses. The 1996 I-O table consists of 97 industries, while the 2000 table has 112 industries. These two tables were transformed into 50-industry tables. The results are, however, presented by using a 15-industry classification, as shown in

table 3.1, to better highlight the structural changes and output growth and to enable a comparative analysis with other countries. Among the 50 industries, 9 industries are in the primary sector, 27 in the secondary sector, and 14 in the tertiary sector. It should be noted that in order to examine real changes over the study period, the original current price 2000 I-O table was converted into a 1996 constant price table using producer price indices by industry or GDP deflators by industry when the former are not available.

This study conducts a comparative analysis on Vietnam, Indonesia and Malaysia. The period of analysis for Indonesia and Malaysia are 1990-1995 and 1987-1991, respectively, due to the availability of national I-O tables. The Indonesian Central Bureau of Statistics (Indonesia CBS, 1995, 1998) published the 1990 and 1995 I-O tables, which are based on producers' prices. The 1990 table consists of 161 industries, while the 1995 table includes 172 industries. These I-O tables were transformed into 37-industry tables, which were then converted into 1983 constant price tables by GDP deflators by industry. In the case of Malaysia, the Malaysian Department of Statistics (Malaysia DS, 1994, 2002) published the 1987 and 1991 I-O tables, which are based on producers' prices. The 1987 table consists of 60 industries, while the 1991 table has 92 industries. For this study, these tables were transformed into 50-industry tables. The 1991 table was then converted into a 1987 constant price table using GDP deflators by industry. It should be noted that in the comparative analyses, the results are all presented using the 15-industry classification, as shown in table 3.1.

4. Structural Changes and Sources of Output Growth in Vietnam 1996-2000

4.1. Structural Changes

A comparison of the structure of I-O tables at two points in time can reveal structural changes during the intervening period. Using the 1996 and 2000 I-O tables, this section examines changes in Vietnam's industrial structure between 1996 and 2000.

Table 4.1 presents changes in the industry allocation of output, value-added, exports, and imports during 1996-2000 at constant 1996 prices. In table 4.1 and the

subsequent tables, the 15 industries are classified into the primary, secondary, and tertiary sectors. The share of agriculture in total output decreased from 21.4% to 15.6%, while the mining industry's output share increased from 4.8% to 8.7%. Therefore, the primary sector as a whole, including agriculture and mining, still played an important role in output. The share of the secondary sector in output rose from 34.5% to 39.8%, mainly due to the near doubling of textile and wearing apparel's share. The industry composition of value-added followed a similar pattern to that of output.

With regard to industry composition of exports, agriculture declined in relative importance, nearly halving its share in total exports, from 15.8% to 8.2%. But, the share of mining increased significantly from 15.3% to 27.6%, reflecting a substantial increase in crude oil exports. On the other hand, the combined share of manufactured exports declined slightly from 45.2% to 43.6%. Among manufacturing industries, the share of textile and wearing apparel increased from 16.0% to 18.9%, which are the results of the government's efforts to promote exports of labor-intensive products, in which Vietnam has comparative advantages.

With regards to the industry composition of imports, machinery and equipment continued to account for more than a quarter of total imports, despite a slight decrease during this period. The large volume of imports of machinery and equipment was primarily driven by large FDI inflows and strong post-Asian crisis recovery in domestic investment during the study period. The second most important import item, chemical products, experienced a fall in import share from 18.1% to 13.9%, mainly reflecting a decrease in fertilizer imports. This might be due to additional import restrictions imposed on fertilizers during the period. In contrast, the textile and wearing apparel industry's import share increased from 7.3% to 11.9% and became the third largest manufacturing industry in imports, after the machinery and equipment industry and the chemical industry. This may be explained by an increase in the importation of textile materials used in the production of textile and wearing apparel exports.

In sum, the changes in the structure of the I-O tables indicate a shift in Vietnam's economy away from agriculture. The secondary sector grew in relative

importance. However, since the mining industry also expanded at the same time, the primary sector continued to contribute significantly to the economy.

Table 4.2 shows the export ratios (exports/output) and import ratios (imports/domestic demand) for each industry. The mining industry had a very high and growing export ratio, thus indicating that mining products, mainly crude oil and natural gas, were mostly exported. Among the manufacturing industries, the textile and wearing apparel industry had the highest export ratio, but it became less export-oriented during this period as its ratio declined from 65.7% to 57.1%. The wood product industry had the second largest export ratio, next to textile and wearing apparel, though its export share was very small, as shown in table 4.1. The machinery and equipment industry's export ratio rose dramatically to 35.7%, and it comprised 6.4% of Vietnam's total exports by 2000. The export ratio of the secondary sector as a whole increased slightly: from 26.4% to 30.2%.

While the import ratios of most manufacturing industries decreased during the study period, they remained very high in 2000. In particular, the machinery and equipment industry had a very high import ratio in 2000 at 69.7%. The import ratio of the secondary sector as a whole decreased to 41.1% from 43.9%. Despite the government's efforts to promote import substitution, more than 40% of the domestic demand for manufactured products was still dependent upon imports.. Vietnam remained heavily dependent on imported intermediate inputs and machinery and equipment.

4.2. Standard Growth Factor Decomposition Analysis

Table 4.3 presents the results of the standard growth-factor decomposition analysis, with all entries expressed as percentages of total national output growth.[4] During 1996-2000, Vietnam's output growth was driven mainly by export expansion (EE), which accounted for 56.3% of total output growth. The industries most affected by export expansion were mining, particularly crude oil and natural gas, which accounted for 15.9% of total output growth, the textile and wearing apparel at 11.2%, and trade at 7.5%. To a much lesser extent, the machinery and equipment industry

[4] The analysis was conducted using the I-O tables for 50 industries; but the results are presented for 15 industries as shown in table 1.

also experienced export expansion as it accounted for 4.9% of total output growth. In total, the secondary sector's export expansion accounted for almost a quarter of total output growth.

To a much lesser extent in comparison to the export expansion effect, the increase in capital formation (DD3) was the second largest source of output growth at 20.5%.[5] As expected, the construction industry accounted for the largest share of this effect at 9.3% of total output growth. In contrast, the secondary sector's capital formation accounted for only 6.5% of total output growth. The increase in household consumption (DD1) was the third largest contributor to output growth at 19.9%. The industries that accounted for much of this effect were food, beverages and tobacco (5.4%), services (5.4%), trade (4.4%), and textile and wearing apparel (2.8%).

In the aggregate, the change in import ratios, or import substitution (IS), had virtually no effect on output growth. However, the secondary sector accounted for the largest positive effect at 6.8% of total output growth. This is reflective of the fact that government protection of certain manufacturing industries, e.g., automobile, fertilizer, iron, and steel, resulted in an increase in domestic production and a concurrent decrease in imports in these industries. Finally, changes in the technical coefficients (IO) were not a major source of output growth during this period, indicating that there was little change in production structure as represented by I-O coefficients.

The secondary sector as a whole accounted for almost half of total output growth, which was much larger than its output share (39.8% in 2000), and almost half of its output growth was brought about by the expansion of exports. This clearly indicates that export expansion in the secondary sector played a pivotal role in Vietnam's output growth during the study period. Among manufacturing industries, the textile and wearing apparel industry and the machinery and equipment industry grew very rapidly at annual growth rates of 30.5% and 32.9%, respectively. Together, they accounted for a quarter of total output growth, and their growth was driven by export expansion. The chemical industry and the iron, steel, and nonferrous metal industry also grew very rapidly at 21.7% and 33.9%, respectively, but the main

[5] In the growth factor decomposition analysis for Vietnam, capital formation (DD3) includes changes in inventory.

source of their output growth was the effect of import substitution. The food, beverage, and tobacco industry grew at a much slower rate, but it accounted for 11.9% of total output growth due to its preponderant share of total output.

The mining industry also grew very rapidly at an annual rate of 29.6%, and its growth accounted for 15.6% of total output growth. It should be noted that export expansion was solely responsible for this industry's significant contribution to output growth. On the other hand, agriculture's contribution to output growth was negligible at 5.3%, which is in contrast to its output share at 15.6% in 2000. The effects of import substitution and export expansion contributed equally to the agricultural industry's output growth.

4.3. Inter-sectoral Interdependence and Sources of Output Growth: Extended Growth Factor Decomposition Analysis

Based on equation (8), tables 4.4 and 4.5 present the results of the extended growth factor decomposition analysis for 15 industries in Vietnam from 1996-2000; the 15 industries are further classified into primary, secondary, and tertiary sectors. In table 4.4, each entry is shown as a percentage share of Vietnam's total output growth, while in table 4.5, each entry is shown as a percentage share of the output growth of each industry or each sector.

In table 4.4, the primary sector column presents the total (direct and indirect) effects on output of each industry due to demand changes in the primary sector. It is the sum of the four effects originating in the primary sector (i.e., the effects of the expansion of domestic demand (DD), export expansion (EE), the changes in import ratios (or domestic supply ratios) (IS), and the changes in technological coefficients (IO) in the primary sector). Similarly, the secondary and tertiary sectors' columns present the total (direct and indirect) effects on output of each industry due to demand changes in the secondary and tertiary sectors, respectively. We should note that equation (9) calculates the total effects on output of each industry in the secondary sector (which includes the 3rd to the 11th industries in the table) due to the demand changes in the primary, secondary, and tertiary sectors.

As expected, the secondary sector played a key role in the total output growth of the economy. In total, 51.6% of total output growth was induced by the effects of

demand changes in the secondary sector. Of this amount, the secondary sector induced growth in the primary and tertiary sectors by 3.6% and 4.1%, respectively, of total output growth. It should be noted that the secondary sector's contribution at 51.6% was much larger than its share of output, which was 39.8% in 2000.

On the other hand, only 18.2% of total output growth was induced by demand changes in the primary sector, and its contribution to the output growth of the secondary and tertiary sectors was merely 0.0% and 2.0%, respectively, of total output growth. The primary sector's contribution at 18.2% was much smaller than its output share, which was 24.4% in 2000. The tertiary sector's contribution to total output growth at 30.2% was also smaller than its output share, which was 35.9%. However, the tertiary sector induced significant growth in the secondary sector at 5.1% of total output growth, thus indicating that the tertiary sector had strong backward linkages with the secondary sector.

It is apparent from table 4.5 that most of the output growth of each sector (primary, secondary, or tertiary sector) was induced by within-sector demand effects.[6] Within-sector effects accounted for 76.9%, 89.6%, and 79.4% of the output growth of the primary, secondary, and tertiary sectors, respectively. It is clear from the following that inter-sectoral linkages of the primary and the tertiary sectors are relatively stronger than those of the secondary sector: 1) in the primary sector, 17.0% and 6.2% of its output growth were induced by demand effects of the secondary and tertiary sectors, respectively; 2) in the tertiary sector, 6.8% and 13.8% of its output growth were induced by the demand effects of the primary and secondary sectors, respectively; and 3) in the secondary sector, however, 0.0% and 10.4% of its output growth were induced by the demand effects of the primary and tertiary sectors, respectively.

Within the primary sector, mining accounted for 15.6% of Vietnam's total output growth, and most of its growth was induced by within-sector demand effects. Tables 4.6 and 4.7 present the details of within-sector demand effects. In table 4.6, each entry is presented as a percentage share of Vietnam's total output growth; in table 4.7, each entry is presented as a percentage share of each industry or each

[6] In equation (9), which describes the extended growth factor decomposition equation for the secondary sector, within-sector demand effects are captured by the terms with $\mathbf{B}_t^{SS}$ in equation (9).

sector. According to these tables, the effect of export expansion within the primary sector is the main driver of the output growth of mining. As shown in table 4.2, the mining industry's export ratio increased substantially during the study period from 63.9% to 87.2%. It is apparent that the growth of mining was driven by export expansion. The mining industry thus appears to have had relatively weak forward linkages to the secondary and tertiary sectors at that time. If and when stronger linkages are developed with Vietnam's secondary sector through the increased flows of mining products to processing activities, it is expected that such linkages will generate higher growth and value-added in the economy.

On the other hand, agriculture's contribution to Vietnam's total output growth was very small at 5.3%, and much of its output growth was induced by the effects of demand changes within the secondary sector (See tables 4.4 and 4.5). According to table 4.6, however, import substitution effects within the primary sector contributed significantly to the output growth of agriculture. In contrast, the expansion of primary exports accounted for only 13.4% of agricultural growth . According to the results of the standard growth factor decomposition analysis, as presented in table 4.3, more than half of agricultural growth is attributed to export expansion. The substantial difference between these two figures is accounted for by the effects of export expansion in the secondary sector. Inter-sectoral interdependence thus played a critical role in the output growth of agriculture.

Within the secondary sector, textile and wearing apparel had the largest contribution to Vietnam's total output growth at 16.6%, followed by food, beverage and tobacco at 11.9% and machinery and equipment at 9.3% (See table 4.4). As indicated in table 4.5, most of the growth of these manufacturing industries was induced by the effects of demand changes within the secondary sector. Export expansion was the main driver of output growth in the textile and wearing apparel industry and the machinery and equipment industry, while the expansion of domestic final demand was the main driver of output growth in the food, beverage and tobacco industry.

The chemical product industry and the iron and steel industry also recorded large output growth during the study period. Again, most of the output growth of these industries was induced by effects originating in the secondary sector. In

contrast with the above top three manufacturing industries, however, import substitution effects played an important role in the output growth of these two industries, accounting for 37.8% and 58.7%, respectively, of their growth. Accordingly, the chemical products industry's import ratio decreased from 69.4% to 54.9% in the study period, while the iron and steel industry's import ratio decreased from 71.0% to 49.3% (see table 4.2).

It should be noted that while the non-metallic mineral products industry accounted for 2.5% of Vietnam's total output growth, most of its growth was induced by effects originating in the tertiary sector, which accounted for 78.9% of its output growth (see table 4.5). Within the tertiary sector, the construction industry would have generated significant demand for non-metallic mineral products (e.g., cement).

In all, nearly half of the output growth of the secondary sector was induced by export expansion within a sector itself. Because of the inter-sectoral interdependence noted above, exports in the secondary sector played a significant role in the output growth of not only the secondary sector but also agriculture.

Within the tertiary sector, trade was the largest contributor to Vietnam's output growth at 13.4%, which was followed by construction at 8.6% and services at 7.1% (see table 4.4). As shown in table 4.5, most of the output growth of construction and trade was induced by the effects of demand changes within the tertiary sector. On the other hand, the primary and secondary sectors contributed 23.0% and 21.9%, respectively, to the output growth of services, indicating that the services industry has strong forward linkages with the primary and secondary sectors.

5. A Comparative Analysis with Indonesia and Malaysia

Table 5.1 presents main economic indicators for Vietnam, Malaysia, and Indonesia in 2000. Vietnam had a much smaller GDP than Malaysia and Indonesia: Vietnam's GDP was 35% of Malaysia's and 19% of Indonesia's. Vietnam's GDP per capita was also smaller at 10% of Malaysia's and 50% of Indonesia's. According to the World Bank (2005), in Vietnam, more than 30% of the population was still living below the national poverty line in 1998, while comparable figures for Malaysia and Indonesia were approximately 15%.

Indonesia and Malaysia are both natural resource-rich countries. Primary exports have contributed significantly to these two economies, especially in the early stages of industrialization. Vietnam, however, does not have similar levels of natural resources. Although Vietnam has mineral resources, which have contributed significantly to export revenue in recent years, its oil reserves on a per capita basis are only a fraction of those of Indonesia and Malaysia (Riedel, 1999). Vietnam also had the smallest amount of arable land per capita among the three countries, as can be seen in table 5.1. Therefore, while resource-based industries have played an important role in the development of Indonesia and Malaysia, their roles have been limited in Vietnam.

Vietnam, like Indonesia but unlike Malaysia, has an abundant labor supply, with a population of 78 million and a population density of 241 persons per km^2 in 2000. Its population density is, in fact, the highest among all three countries. Vietnam also has a relatively high level of human development. As an example, its adult literacy rate was the highest among the three countries in 2000. Thus, it has the potential for the development of labor-intensive industries, especially in the early stages of its economic development.

5.1. Industrial Structure

Table 5.2 presents the industrial structures of Vietnam from 1996-2000, Malaysia from 1987-1991, and Indonesia from 1990-1995 in terms of output and value added. Vietnam had the largest agricultural share in both output and value-added among the three countries, thus confirming that Vietnam is still a highly agriculture-based economy in 2000. However, agriculture's share of economic output decreased markedly in all three countries during the aforementioned periods, while the secondary sector gained in relative importance and exceeded 20% in value added in the terminal year.

Within the secondary sector, light industries (industries 4-7 in table 5.2) accounted for a greater share of output and value-added in Vietnam and Indonesia than heavy industries (industries 8-11 for Vietnam; industries 3 and 8-11 for Indonesia). In Vietnam, heavy industries grew very rapidly during the study period, but the output share of heavy industries was still 13.3% in 2000, which was much

smaller than the share of light industries at 25.5%. In Indonesia, despite the inclusion of the oil refining industry, heavy industries still comprised a smaller segment of the economy in comparison to light industries: heavy industries accounted for 15.0% of total output in 1995, while light industries accounted for 19.1% of total output. On the other hand, in Malaysia, heavy industries' share of total output was much larger than light industries' in both output and value added. In 1987, heavy industries accounted for 21.7% of total output in Malaysia, and this increased markedly in the study period due mainly to the rapid expansion of the machinery and equipment industry: by 1991, heavy industries' share of total output had increased to 30.2% of total output, which is in sharp contrast to light industries' 13.6% of total output.

5.2. Standard Growth Factor Decomposition Analysis

Table 5.3 presents the results of the standard growth factor decomposition analysis for Vietnam from 1996-2000, Malaysia from 1987-1991, and Indonesia from 1990-1995.[7] For Malaysia and Indonesia, output growth due to the expansion of domestic final demand is decomposed into the four components of the domestic final demand sectors, as presented in equation (7): household consumption expenditure (DD1); government consumption expenditure (DD2); capital formation (DD3); and changes in inventory (DD4). However, in the case of Vietnam, the effect of the change in capital formation (DD3) also includes the effect due to inventory changes.

It can be seen from table 5.3 that while the major driver of output growth was export expansion (EE) in Vietnam and Malaysia, Indonesia's output growth was driven by the expansion of household consumption (DD1). Export expansion (EE) was the third largest source of output growth in Indonesia, contributing only 16.4% to total output growth. These observations indicate that Vietnam and Malaysia were relatively more outward-looking than Indonesia during each country's respective study periods.

The secondary sector played a prominent role in the output growth of Vietnam and Malaysia, as it accounted for 49.1% and 53.3%, respectively, of total

[7] For Malaysia and Indonesia, the analysis was performed using the I-O tables for 50 industries and 37 industries, respectively.

output growth. However, whereas light industries played a more important role than heavy industries in Vietnam, heavy industries, especially the machinery and equipment industry, served as the principal contributor to Malaysia's output growth, as they contributed 41.8% to total output growth. Much of the output growth of heavy industries in Malaysia was due to the expansion of export (EE) and was supported by the increase in capital formation (DD3), especially foreign direct investment. In Vietnam, much of the output growth of light industries, especially the textile and wearing apparel industry, was induced by the expansion of export (EE), but the effect of capital formation was negligible.

As described in the previous section, in Vietnam, the mining industry played a very important role, as it accounted for 15.6% of Vietnam's total output growth. Much of its growth was driven by the expansion of export (EE). It should be noted that the change in import ratios (IS) had a notable effect on the output growth of the secondary sector in Vietnam, reflecting an increase in domestic supply in some manufacturing industries in accordance with the government's import substitution policy. On the other hand, in Malaysia, with the exception of the machinery and equipment industry, the change in import ratios (IS) had a negative effect on manufacturing industries.

Indonesia showed a quite different pattern of output growth during its study period than Vietnam and Malaysia in their respective study periods. First, the tertiary sector played a more important role than the secondary sector. According to Akita and Hermawan (2000), this is true even in the period of 1985-1990, in which the tertiary sector accounted for 55% of total output growth, while the secondary sector contributed 47%. Secondly, as mentioned above, the expansion of household consumption (DD1) was the main source of output growth in Indonesia as it accounted for 52.4% of total output growth. In Indonesia, the food, beverage, and tobacco industry contributed significantly to output growth, and its output growth was driven mainly by the expansion of household consumption (DD1). The industry seems to have induced major expansion in agriculture. Within Indonesia's secondary sector, the role of light industries was more significant than heavy industries in total output growth. This is similar to Vietnam's growth pattern; but, while the export-oriented textile and wearing apparel industry led the secondary sector in

Vietnam, the domestic demand-oriented food, beverage and tobacco industry led the secondary sector in Indonesia.

5.3. Inter-sectoral Interdependence and Sources of Output Growth: Extended Growth Factor Decomposition Analysis

Tables 5.4 and 5.5 present the results of the extended growth-factor decomposition analysis, based on equation (8), for Vietnam from 1996-2000, Malaysia from 1987-1991, and Indonesia from 1990-1995. In these tables, the results are presented in an aggregated format in order to highlight the roles of inter-sectoral interdependence in the growth of output among the three sectors: the primary, secondary and tertiary sectors.[8]

In Malaysia, 57.4% of total output growth was induced by the effects of demand changes in the secondary sector, which contributed 1.8% and 6.9% to the output growth of the primary and tertiary sectors, respectively. On the other hand, in Indonesia, only 40.2% of total output growth was induced by the effects of demand changes in the secondary sector. However, the secondary sector contributed significantly to the output growth of the primary sector. According to table A3 in the Appendix, its contribution to the output growth of agriculture was 6.7% of total output growth, indicating that the secondary sector, especially the food, beverage and tobacco industry, had very strong backward linkages with agriculture. In contrast, in Malaysia, the secondary sector had strong backward linkages with the tertiary sector, especially trade (see table A1 in the Appendix). Its linkages with the primary sector were very weak.

The contribution of Vietnam's secondary sector to the country's output growth is in between the contribution of Malaysia and Indonesia's secondary sectors to their respective country's output growth. In Vietnam, 51.6% of total output growth was induced by the effects of demand changes in the secondary sector, which contributed 3.6% and 4.1% to the output growth of the primary and tertiary sectors, respectively. Whereas Vietnam's secondary sector had stronger backward linkages with agriculture than Malaysia's, it had weaker linkages than Indonesia's.

[8] The results for 15 industries in Malaysia and 16 industries in Indonesia are given in the appendix.

Vietnam's secondary sector contributed little to the output growth of the tertiary sector.

In all three countries, the primary sector contributed very little to the output growth of the other two sectors. However, Vietnam's primary sector seems to have had relatively strong linkages with the tertiary sector, especially services. Unlike Vietnam and Malaysia, the tertiary sector played a prominent role in Indonesia. While its output growth amounted to 52% of total output growth, its demand effects brought about 57.8% of total growth, and its contribution to the primary and secondary sectors was 3.4% and 7.3%, respectively, of total growth. In Indonesia, the demand effects originating in the tertiary sector generated 57.8% of total output growth, which is much higher than the 40.2% of total output growth generated by the secondary sector's demand effects. In Vietnam, by contrast, only 30.2% of total output growth was induced by the tertiary sector's demand effects, which was much smaller than the 51.6% of output growth induced by the secondary sector's demand effects. Malaysia's tertiary sector's contribution to total output growth is in between Vietnam's and Indonesia's.

According to table 5.5, in all three countries, most of the output growth of the secondary and tertiary sectors was induced by within-sector demand effects. In Vietnam, most of the primary sector's growth was also induced by within-sector demand effects. However, this is due to a large within-sector effect in mining, which experienced output growth driven mostly by the expansion of within-sector export demand. On the other hand, 57% of agriculture's growth was brought about by demand effects from the secondary sector.

In Indonesia, agriculture's output growth depended heavily on the secondary sector: according to table A4, 94% of agriculture's growth was brought about by the demand effects from the secondary sector. However, mining seems to have had very weak forward linkages with the secondary sector as its growth was not at all affected by demand effects from the secondary sector. On the other hand, in Malaysia, more than half of agriculture's growth was brought about by within-sector effects (see table A2). However, unlike Indonesia and Vietnam, Malaysia's mining industry had very strong forward linkages with the secondary and tertiary sectors; only 30% of its output growth was induced by within-sector effects.

6. Summary of Findings and Concluding Remarks

Vietnam underwent a structural transformation from agricultural production towards non-agricultural production between 1996 and 2000. The manufacturing sector's contribution to total output and value-added increased by over five percentage points during this period. However, as the mining industry expanded at the same time, the primary sector's contribution to economic output continued to be significant.

Exports of textile and wearing apparel grew in relative importance, reflecting some positive results of the Vietnamese government's efforts to promote exports of labor-intensive products, in which Vietnam had comparative advantages. The overall export structure, however, remained heavily dependent on natural resources. Domestic production relied substantially on imported intermediate inputs, machinery, and equipment despite the government's intention to sustain its import substitution policies.

The major source of output growth from 1996-2000 in Vietnam was the expansion of exports, mainly in the mining industry and the textile and wearing apparel industry. While the effect of the secondary sector's export expansion on output growth remained modest, it is not altogether disappointing, given the adverse impact of the Asian crisis on the demand for and the competitiveness of Vietnamese exports during this period. However, the national output growth's obvious and strong dependence on the export of mining products, particularly crude oil, should be a cause for concern given Vietnam's limited natural resources endowment. To maintain export expansion as the major driver of economic growth, Vietnam's export base will need to be diversified to include more processed products.

The effect of the decrease in import ratios, or import substitution, was the major source of output growth in several heavy industries such as the chemical products industry, the iron, steel and nonferrous metals industry, and the machinery and equipment industry, which enjoyed strong trade protection under the auspices of the government. These industries should nevertheless consider exploring other sources of growth since protection measures will be abolished when Vietnam fully complies with its obligations under the ASEAN Free Trade Area (AFTA) and when it joins the World Trade Organization (WTO) in the future.

According to the extended growth factor decomposition analysis, the secondary sector played a key role in Vietnam's output growth; in fact, its demand effects induced more than half of total output growth. As expected, the secondary sector had the greatest potential to induce growth in the other two sectors while concurrently generating its own growth – its combined contribution to the other sectors was about 8% of total output growth. Therefore, as Vietnam shifts away from primary production towards secondary production in the process of industrialization, it can expect to achieve higher growth levels. On the other hand, the tertiary sector's contribution was much smaller than the secondary sector's, but the tertiary sector contributed significantly to the output growth of the secondary sector, indicating that the former had strong backward linkages with the latter.

Exports in the secondary sector played a significant role in inducing the output growth of both primary and secondary sectors. Manufactured exports should thus be promoted as a potential catalyst of economic growth. In addition, stronger linkages between the primary sector, particularly the mining industry, and the secondary sector are expected to generate higher value-added for the economy through the processing of primary products.

The comparative country analysis revealed that although Indonesia from 1990-1995 and Malaysia from 1987-1991 were far ahead of Vietnam from 1996-2000 in terms of industrialization, both countries also underwent some similar structural changes. The decline in importance of agriculture was evidenced across all three countries, though from different levels and at different rates. Vietnam, however, remained the most agriculturally-based economy among the three. The secondary sector did expand its share in all three economies; however the Malaysian secondary sector had the largest share and, unsurprisingly, recorded the highest level of output growth among the three countries. In contrast, the Indonesian secondary sector comprised the smallest share.

The industry composition of the secondary sector varied among the three countries. As expected, heavy industries had a much larger share than light industries in both output and value added in Malaysia, which was the most industrialized country among the three. Malaysia's heavy industries continued to expand due mainly to the rapid growth of the machinery and equipment industry. On the other

hand, in Vietnam and Indonesia, which were both at earlier stages of industrialization, the importance of light industries outweighed heavy industries in the secondary sector.

Another notable finding from the comparative analysis was the major source of output growth. The relatively higher growth levels of Malaysia and Vietnam were both supported by export expansion, which was the dominant driver of output growth. This would appear to underscore the importance of export expansion to output growth, thus recommending an export-oriented industrialization strategy over an inward-looking strategy. The secondary sector played a prominent role in the output growth of Malaysia and Vietnam. Heavy industries, especially the machinery and equipment industry, served as the principal contributor to Malaysia's output growth; much of the output growth of the heavy industries was brought about by the expansion of export and, to a lesser extent, by the increase in capital formation. On the other hand, light industries played a more important role than heavy industries in the output growth of Vietnam. The output growth of the light industries was induced mainly by the expansion of exports, but the effect of capital formation was negligible. In Vietnam, the mining industry also played an important role, but its growth was mostly driven by the expansion of export.

Indonesia had a very different pattern of output growth from Vietnam and Malaysia – the tertiary sector played a more important role than the secondary sector. In Indonesia, the expansion of household consumption was the main source of output growth as it accounted for more than half of total output growth. The food, beverage, and tobacco industry contributed significantly to output growth in Indonesia, and its output growth was driven mainly by the expansion of household consumption.

According to the extended growth factor decomposition analysis, the contribution of Vietnam's secondary sector is in between Malaysia's and Indonesia's. In Malaysia, 57% of total output growth was induced by demand effects from the secondary sector, which contributed significantly to the growth of the tertiary sector. In contrast, the secondary sector induced only 40% of total output growth in Indonesia, but it contributed significantly to the output growth of agriculture, thus indicating that this sector, especially the food, beverage and tobacco industry, had very strong backward linkages with agriculture. Vietnam's secondary sector had

stronger backward linkages with agriculture than Malaysia's but weaker than Indonesia's. Vietnam's secondary sector contributed relatively little to the output growth of the tertiary sector.

In sum, within only four years from 1996-2000, Vietnam had achieved substantial progress towards industrialization in the following ways: (1) the structure of production shifted away from agricultural towards non-agricultural activities; and (2) the secondary sector expanded substantially. As the secondary sector continues to expand during the industrialization process, it will lead to higher economic growth rates. Finally, as a sign of growing international competitiveness and the success of the open door policy, export expansion became the major source of output growth.

As the Vietnamese government continues its policy of rapid modernization and industrialization, policymakers should continue to strengthen export expansion through a more explicit export-oriented industrialization strategy and further diversification of the export structure to include more manufactured exports, particularly labor-intensive products. Given the importance of inter-sectoral interdependence in output growth, linkages between the three sectors of the economy should be strengthened so as to accelerate output growth and generate higher value-added.

References

Akita, T. (1991). Industrial structure and the sources of industrial growth in Indonesia: an I-O analysis between 1971 and 1985. *Asian Economic Journal* 5 (2), 139-158.

Akita, T. and Hermawan, A. (2000). The sources of industrial growth in Indonesia, 1985-95. *ASEAN Economic Bulletin* 17(3), 270-286.

Bui, T.T. (1994). Doi moi va su chuyen dich co cau kinh te trong qua trinh phat trien o Viet Nam (Economic reforms and structural transformation in Vietnam). In T.A. Vu, (Ed.), *Doi Moi Kinh Te va Phat Trien (Economic Reforms and Development)*. Hanoi: Social Sciences Publisher.

Center for International Economics (CIE). (1999). *Trade and Industry Policies for Economic Integration*. Canberra and Sydney: Center for International Economics.

Central Institute for Economic Management (CIEM). (1994) Doi Moi Kinh Te o Vietnam – Thanh Tuu va Trien Vong (Vietnam's Economic Reforms – Achievements and Prospects). Hanoi: CIEM/SIDA.

Chenery, H.B. (1980). Interactions between industrialization and exports, *American Economic Review*, 70(2): 281-287.

Chenery, H.B., and Syrquin, M. (1979). A comparative analysis of industrial growth. In R.C.O. Mathews, (Ed.), *Economic Growth and Resources*. New York: Macmillan.

Dodsworth, J., Spitaller, E., Braulke, M., Lee, K.H., Miranda, K., Mulder, C., Shishido, H., and Srinivasan, K. (1996). *Vietnam: Transition to A Market Economy*. International Monetary Fund: Occasional Paper No. 135.

Gates, C.L. (2000). Vietnam's economic transformation and convergence with the dynamic ASEAN economics. *Comparative Economic Studies* 42(4), 8-19.

Indonesia, Central Bureau of Statistics (Indonesia CBS) (1995). *Indonesian Input-Output Table 1990*. Jakarta: Central Bureau of Statistic.

Indonesia Central Bureau of Statistics (Indonesia CBS) (1998). *Indonesian Input-Output Table 1995*. Jakarta: Central Bureau of Statistic.

International Monetary Fund (IMF). (1998). *Vietnam: Selected Issues and Statistical Annex*. Washington DC: IMF Staff Country Report No. 98/30.

James, William, and Fujita Natsuki (1989) Import substitution and export promotion in the growth of the Indonesian industrial sector, *ASEAN Economic Bulletin* 6(1): 59-70.

James, William, and Fujita Natsuki (1997) Employment creation and manufactured exports in Indonesia, 1980–90, *Bulletin of Indonesian Economic Studies* 33(1): 103-115.

Kokko, A. (1998). Vietnam – ready for doi moi II? Stockholm School of Economics: SSE/EFI Working Paper Series in Economics and Finance No. 286.

Le, V.D., and Tran, T.T.H. (1999) Cong nghiep Vietnam trong chang duong 15 nam doi moi – thanh tuu va thach thuc (Vietnam's industry during 15 years of reforms – accomplishments and difficulties). *Nghien Cuu Kinh Te (Economic Studies)* No. 254, 3-22.

Malaysia, Department of Statistics, Malaysia. (Malaysia DS) (1994). *Input-Output Tables, 1987*.

Malaysia, Department of Statistics, Malaysia.(Malaysia DS) (2002). *Input-Output Tables, 1991*.

Martin, R.P., and Holland, D. (1992). Sources of output change in the U.S. economy. *Growth and Change* 23(4): 446-468.

Pham, H.M. (2004). *FDI and Development in Vietnam: Policy Implications*. Singapore: Institute of Southeast Asian Studies.

Riedel, J. (1999). Needed: a strategic vision for setting reform priorities in Vietnam. In S.Leung, (Ed.), *Vietnam and the East Asian Crisis*. Cheltenham: Edward Elgar.

Riedel, J., and Comer, B. (1997). Transition to market economy in Vietnam. In W.T. Woo, S. Parker, and J.D. Sachs, (Eds.), *Economies in Transition: Comparing Asia and Europe*. Cambridge: MIT Press.

Tarp, F., Roland-Host, D., and Rand, J. (2002). Economic Structure and Development in an Emergent Asian Economy: Evidence from a Social Accounting Matrix for Vietnam. Vietnam Central Institute for Economic Management Discussion Paper No. 0202.

Urata, S. (1987). Sources of economic growth and structural change in China: 1956-1981. *Journal of Comparative Economics* 11(1), 96-115.

Van Arkadie, B., and Mallon, R. (2003). *Viet Nam: A Transition Tiger?*. Canberra: Asia Pacific Press.

Vietnam, General Statistical Office (Vietnam GSO). (1999). *1996 Vietnam Input-Output Table.* Hanoi: Statistical Publishing House.

Vietnam, General Statistical Office (Vietnam GSO). (2003). *2000 Vietnam Input-Output Table.* Hanoi: Statistical Publishing House.

Vo, H.D. (2000) Tang truong va co cau kinh te Vietnam tu 1975 den 1998 (Vietnam: growth and economic structure 1975-1998). *Nghien Cuu Kinh Te (Economic Studies)* No. 266, 3-10, and No. 267, 11-21.

Vo, H.D. (2002) Tang truong cong nghiep – phan tich tu co cau (Industrial growth – a structural analysis). *Nghien Cuu Kinh Te (Economic Studies)* No. 285, 16-27, and No. 286, 17-23.

World Bank (WB). (1999). *Vietnam – Preparing for Take-off? How Vietnam can Participate Fully in the East Asian Recovery*. Hanoi: An Informal Economic Report of the World Bank Consultative Group Meeting for Vietnam.

World Bank (2005), *World Development Indicators*, World Bank

Zakariah, Abdul Rashid, and Ahmad Elyas Elameer (1999). Sources of industrial growth using the factor decomposition approach: Malaysia, 1978-87, *The Developing Economies* 37(2): 162-96

Table 3.1
Industry Classification

3 Sectors		15 Industries		50 Industries	
1	Primary	1	Agriculture	1	Agriculture Farming
				2	Livestock Breeding
				3	Agriculture Services
				4	Forestry
				5	Fishery
		2	Mining	6	Coal mining
				7	Metal ore mining
				8	Stone and other non-metallic mineral quarrying
				9	Crude oil, natural gas
2	Secondary	3	Food/Beverages/Tobacco	10	Food Industries
				11	Beverages Industries
				12	Sugar refineries
				13	Coffee processing
				14	Tea processing
				15	Tobacco manufacturing
				16	Processing seafood
		4	Textile/Wearing Apparel	33	Textile products
				34	Leather and leather products
		5	Wood products	20	Wood and wood products
		6	Paper/Printing/Publishing	19	Paper pulp, paper and paper products
				35	Printing & publishing industries
		7	Chemical Products	22	Industrial chemicals
				23	Fertilizers and pesticides
				24	Other chemical products
				25	Rubber and plastic products
		8	Non-metallic mineral products	17	Glass and glass products
				18	Ceramic and ceramic products
				21	Building materials industries
		9	Iron/Steel/Nonferrous metals	31	Ferrous metals manufactures
				32	Nonferrous metals
		10	Machinery/Equipment	26	Professional and scientific equipment
				27	Transportation equipment
				28	Machinery and equipment (except electrical)
				29	Electrical machinery, equipment & appliances
				30	Communication and broadcasting equipment
		11	Other Manufacturing	36	Other manufacturing industries
3	Tertiary	12	Electricity/Gas/Water	37	Electricity and Gas
				38	Water supply and distribution
		13	Construction	39	Construction
		14	Trade	40	Trade & repair work
				41	Hotels and restaurants
		15	Services	42	Transport
				43	Communication
				44	Tourism
				45	Finance
				46	Insurance
				47	Science and technology
				48	Real estate, leasing and consulting services
				49	Government and other services
				50	Services serving ind., houshd. and community

Table 4.1

Industrial Structure of Output, Value-Added, Exports, and Imports
at 1996 constant prices

in %

		Output		Value Added		Exports		Imports	
	Industry/Sector	1996	2000	1996	2000	1996	2000	1996	2000
1	Agriculture	21.4	15.6	31.2	22.3	15.8	8.2	7.5	1.2
2	Mining	4.8	8.7	6.0	15.6	15.3	27.6	0.3	0.9
	Primary Sector	26.3	24.4	37.2	37.9	31.1	35.9	7.8	2.2
3	Food/Beverages/Tobacco	15.4	14.1	6.9	7.6	18.7	12.4	5.0	3.3
4	Textile/Wearing Apparel	4.9	9.1	2.8	4.5	16.0	18.9	7.3	11.9
5	Wood products	2.2	1.0	0.8	0.6	3.5	1.6	0.7	0.3
6	Paper/Printing/Publishing	1.4	1.3	0.7	1.0	0.8	0.3	2.0	1.4
7	Chemical Products	2.5	3.6	1.2	3.0	1.8	0.8	18.1	13.9
8	Non-metallic mineral products	3.0	2.8	2.0	1.8	1.0	0.4	2.7	1.5
9	Iron/Steel/Nonferrous metals	1.0	2.0	0.6	0.8	0.0	0.7	8.6	6.0
10	Machinery/Equipment	2.5	4.9	1.1	3.2	2.1	6.4	27.5	25.1
11	Other Manufacturing	1.6	0.9	1.0	0.5	1.3	2.0	1.1	3.1
	Secondary Sector	34.5	39.8	17.2	22.8	45.2	43.6	73.0	66.6
12	Electricity/Gas/Water	2.5	2.0	2.4	2.9	0.0	0.5	9.0	11.1
13	Construction	9.8	9.3	6.4	5.4	0.0	0.0	0.0	0.0
14	Trade	9.1	10.6	12.8	12.0	11.3	12.8	2.3	12.8
15	Services	17.8	13.9	24.0	18.9	12.4	7.3	7.9	7.3
	Tertiary Sector	39.2	35.9	45.6	39.2	23.7	20.5	19.2	31.3
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 4.2
Export Ratio and Import Ratio

(in %)

		Export ratio		Import ratio	
	Industry/Sector	1996	2000	1996	2000
1	Agriculture	14.9	14.5	10.1	2.6
2	Mining	63.9	87.2	5.2	19.1
	Primary	23.9	40.6	9.7	4.2
3	Food/Beverages/Tobacco	24.5	24.2	10.5	8.2
4	Textile/Wearing Apparel	65.7	57.1	54.0	46.8
5	Wood products	32.3	44.4	11.3	14.2
6	Paper/Printing/Publishing	10.9	5.5	30.4	25.5
7	Chemical Products	14.0	6.4	69.4	54.9
8	Non-metallic mineral products	6.8	3.5	20.9	13.7
9	Iron/Steel/Nonferrous metals	1.0	10.2	71.0	49.3
10	Machinery/Equipment	16.9	35.7	78.5	69.7
11	Other Manufacturing	15.5	60.5	17.9	71.8
	Secondary	26.4	30.2	43.9	41.1
12	Electricity/Gas/Water	0.0	6.8	49.4	63.8
13	Construction	0.0	0.0	0.0	0.0
14	Trade	25.0	33.1	8.5	34.3
15	Services	14.1	14.4	12.3	15.2
	Tertiary	12.2	15.8	13.2	23.1

Table 4.3

Sources of Output Growth,1996-2000
Standard Growth Factor Decomposition Analysis
(as Percentage of Total Output Growth)

(in %)

	Industry/Sector	IS	IO	DD1	DD2	DD3	EE	Total	G. Rate
1	Agriculture	3.1	-1.4	-0.5	0.0	1.0	3.2	5.3	3.3
2	Mining	-0.1	-1.1	0.1	0.0	0.9	15.9	15.6	29.6
	Primary	2.9	-2.5	-0.4	0.0	1.9	19.1	21.0	9.7
3	Food/Beverages/Tobacco	1.3	0.8	5.4	0.0	1.0	3.4	11.9	9.5
4	Textile/Wearing Apparel	1.2	1.3	2.8	0.0	0.0	11.2	16.6	30.5
5	Wood products	-0.1	-1.5	0.0	0.0	0.3	0.1	-1.1	-7.7
6	Paper/Printing/Publishing	0.1	-0.3	1.0	0.0	0.1	0.2	1.1	9.2
7	Chemical Products	2.0	0.3	1.3	0.0	0.7	1.0	5.4	21.7
8	Non-metallic mineral products	0.5	0.0	0.0	0.0	1.8	0.2	2.5	10.1
9	Iron/Steel/Nonferrous metals	2.1	-0.8	0.1	0.0	1.0	1.4	3.8	33.9
10	Machinery/Equipment	1.4	1.3	0.0	0.0	1.7	4.9	9.3	32.9
11	Other Manufacturing	-1.8	0.7	-0.6	0.0	-0.1	1.5	-0.4	-3.7
	Secondary	6.8	1.8	10.1	0.0	6.5	23.9	49.1	15.9
12	Electricity/Gas/Water	-1.6	0.7	0.4	0.0	0.4	1.2	1.0	5.2
13	Construction	0.0	-0.9	0.0	0.0	9.3	0.1	8.6	10.6
14	Trade	-6.0	5.9	4.4	0.0	1.6	7.5	13.4	16.3
15	Services	-2.0	-1.5	5.4	-0.2	0.8	4.5	7.1	5.2
	Tertiary	-9.6	4.2	10.2	-0.2	12.1	13.3	30.0	9.4
	Total	0.1	3.5	19.9	-0.2	20.5	56.3	100.0	

Table 4.4

Sources of Output Growth, 1996-2000
Extended Growth Factor Decomposition Analysis
(as Percentage of Total Output Growth)

(in %)

	Industry/Sector	Primary	Secondary	Tertiary	Output Growth
1	Agriculture	1.7	3.0	0.5	5.3
2	Mining	14.4	0.5	0.8	15.6
	Primary	16.1	3.6	1.3	21.0
3	Food/Beverages/Tobacco	-0.1	11.5	0.5	11.9
4	Textile/Wearing Apparel	0.0	16.5	0.1	16.6
5	Wood products	0.0	-1.4	0.4	-1.1
6	Paper/Printing/Publishing	0.0	0.7	0.3	1.1
7	Chemical Products	-0.1	4.9	0.6	5.4
8	Non-metallic mineral products	0.0	0.5	1.9	2.5
9	Iron/Steel/Nonferrous metals	0.0	3.2	0.6	3.8
10	Machinery/Equipment	0.1	8.5	0.6	9.3
11	Other Manufacturing	0.0	-0.5	0.1	-0.4
	Secondary	0.0	43.9	5.1	49.1
12	Electricity/Gas/Water	0.3	0.7	0.0	1.0
13	Construction	0.1	0.1	8.4	8.6
14	Trade	0.1	1.8	11.5	13.4
15	Services	1.6	1.5	3.9	7.1
	Tertiary	2.0	4.1	23.8	30.0
	Total	18.2	51.6	30.2	100.0

Table 4.5

Sources of Output Growth, 1996-2000
Extended Growth Factor Decomposition Analysis
(as Percentage of the Output Growth of Each Industry or Each Sector)

(in %)

	Industry/Sector	Primary	Secondary	Tertiary	Output Growth
1	Agriculture	32.9	57.0	10.1	100
2	Mining	91.8	3.4	4.8	100
	Primary	76.9	17.0	6.2	100
3	Food/Beverages/Tobacco	-0.4	96.6	3.9	100
4	Textile/Wearing Apparel	0.1	99.4	0.6	100
5	Wood products	-2.4	136.2	-33.8	100
6	Paper/Printing/Publishing	2.3	65.1	32.6	100
7	Chemical Products	-2.3	92.0	10.3	100
8	Non-metallic mineral products	-1.1	22.2	78.9	100
9	Iron/Steel/Nonferrous metals	1.1	83.3	15.7	100
10	Machinery/Equipment	1.4	91.9	6.7	100
11	Other Manufacturing	5.1	126.4	-31.5	100
	Secondary	0.0	89.6	10.4	100
12	Electricity/Gas/Water	26.4	70.4	3.2	100
13	Construction	0.8	0.6	98.5	100
14	Trade	0.6	13.6	85.7	100
15	Services	23.0	21.9	55.1	100
	Tertiary	6.8	13.8	79.4	100
	Total	18.2	51.6	30.2	100

Table 4.6

Within-Sector Sources of Output Growth, 1996-2000
(as Percentage of Total Output Growth)

(in %)

	Industry/Sector	IS	IO	DD	EE	Total
1	Agriculture	2.8	-1.4	-0.3	0.7	1.7
2	Mining	-0.3	-1.0	0.1	15.7	14.4
	Primary Sector	2.5	-2.5	-0.3	16.4	16.1
3	Food/Beverages/Tobacco	1.4	0.8	6.2	3.1	11.5
4	Textile/Wearing Apparel	1.3	1.3	2.8	11.2	16.5
5	Wood products	0.0	-1.5	0.0	0.1	-1.4
6	Paper/Printing/Publishing	0.2	-0.3	0.8	0.0	0.7
7	Chemical Products	2.0	0.7	1.5	0.8	4.9
8	Non-metallic mineral products	0.6	0.2	-0.3	0.1	0.5
9	Iron/Steel/Nonferrous metals	2.2	-0.8	0.5	1.3	3.2
10	Machinery/Equipment	1.8	1.1	1.1	4.6	8.5
11	Other Manufacturing	-1.8	0.7	-0.9	1.4	-0.5
	Secondary Sector	7.7	2.1	11.6	22.6	43.9
12	Electricity/Gas/Water	-1.8	0.6	0.6	0.6	0.0
13	Construction	0.0	-0.9	9.4	0.0	8.4
14	Trade	-6.4	5.9	6.0	6.0	11.5
15	Services	-2.2	-1.4	5.6	2.0	3.9
	Tertiary Sector	-10.5	4.1	21.5	8.6	23.8

Table 4.7

Within-Sector Sources of Output Growth, 1996-2000
(as Percentage of the Output Growth of Each Industry or Each Sector)

(in %)

	Industry/Sector	IS	IO	DD	EE	Total
1	Agriculture	53.1	-27.1	-6.5	13.4	32.9
2	Mining	-2.2	-6.6	0.5	100.1	91.8
	Primary Sector	11.8	-11.8	-1.3	78.1	76.9
3	Food/Beverages/Tobacco	11.7	6.5	52.2	26.1	96.6
4	Textile/Wearing Apparel	7.6	7.5	16.7	67.5	99.4
5	Wood products	1.2	140.5	1.7	-7.3	136.2
6	Paper/Printing/Publishing	21.5	-32.7	74.0	2.3	65.1
7	Chemical Products	37.8	12.2	27.2	14.8	92.0
8	Non-metallic mineral products	24.2	7.6	-12.7	3.1	22.2
9	Iron/Steel/Nonferrous metals	58.7	-20.3	11.9	32.9	83.3
10	Machinery/Equipment	18.8	11.9	11.7	49.5	91.9
11	Other Manufacturing	438.0	-178.3	212.8	-346.1	126.4
	Secondary Sector	15.7	4.3	23.6	46.0	89.6
12	Electricity/Gas/Water	-180.5	59.9	63.6	60.2	3.2
13	Construction	-0.5	-10.4	109.2	0.3	98.5
14	Trade	-47.8	43.9	44.5	45.1	85.7
15	Services	-31.3	-20.2	78.7	27.9	55.1
	Tertiary Sector	-34.8	13.8	71.7	28.8	79.4

Table 5.1

Main Economic Indicators in 2000, Vietnam, Malaysia, and Indonesia

Indicator	Vietnam	Malaysia	Indonesia
GDP (billion US dollars)	31.2	90.3	165.0
GDP per capita (US dollars)	397	3,881	800
Population (in million people)	78.5	23.3	206.3
Population density (number of persons per square km)	241.2	70.8	113.9
Arable land per capita (hectares per 1000 persons)	74.0	88.3	90.0
Literacy rate (%)	93	87	87

Note: Values for arable land per capita are in 1995
Source: World Development Indicators.

Table 5.2

Industrial Structure in Output and Value Added

in %

		Output						Value Added					
		Vietnam		Malaysia		Indonesia		Vietnam		Malaysia		Indonesia	
	Industry/Sector	1996	2000	1987	1991	1990	1995	1996	2000	1987	1991	1990	1995
1	Agriculture	21.4	15.6	12.9	9.0	12.2	10.1	31.2	22.2	19.3	15.1	17.6	14.9
2	Mining	4.8	8.7	6.2	4.5	8.9	7.0	6.0	15.6	10.8	8.2	14.0	11.6
	Primary Sector												
3	Oil Refinery					6.2	3.7					4.6	3.0
4	Food/Beverages/Tobacco	15.4	14.1	10.0	7.6	10.4	11.7	6.9	7.6	3.3	2.4	5.4	6.7
5	Textile/Wearing Apparel	4.9	9.1	2.2	2.3	3.5	4.0	2.8	4.5	1.5	1.5	1.9	2.4
6	Wood products	2.2	1.0	2.9	2.4	2.3	2.1	0.8	0.6	1.9	1.2	1.7	1.2
7	Paper/Printing/Publishing	1.4	1.3	1.2	1.3	1.1	1.3	0.7	1.0	0.8	1.1	0.6	0.9
8	Chemical Products	2.5	3.6	9.1	7.4	3.2	4.5	1.2	3.0	4.6	4.0	1.5	2.3
9	Non-metallic mineral products	3.0	2.8	1.2	1.4	0.7	0.8	2.0	1.8	1.1	1.3	0.4	0.3
10	Metal Products	1.0	2.0	2.6	3.6	1.3	1.2	0.6	0.8	1.3	2.0	0.7	0.7
11	Machinery/Equipment	2.5	4.9	8.8	17.8	4.2	4.8	1.1	3.2	4.9	9.8	2.5	3.0
12	Other Manufacturing	1.6	0.9	0.6	1.0	0.1	0.3	1.0	0.5	0.4	0.2	0.1	0.2
	Secondary Sector	34.5	39.8	38.5	44.8	31.1	33.2	17.2	22.8	19.7	23.6	18.6	20.1
13	Electricity/Gas/Water	2.5	2.0	2.2	2.2	1.2	0.9	2.4	2.9	2.9	3.2	0.5	0.4
14	Construction	9.8	9.3	6.9	6.9	11.1	11.9	6.4	5.4	3.8	3.4	6.8	8.9
15	Trade	9.1	10.6	9.9	10.7	8.0	13.1	12.8	12.0	11.6	14.6	11.5	16.4
16	Services	17.8	13.9	23.4	21.9	25.6	22.6	24.0	18.9	31.9	31.9	30.1	27.2
	Tertiary Sector	39.2	35.9	42.4	41.7	45.9	48.5	45.6	39.2	50.2	53.2	48.9	52.8
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 5.3

Sources of Output Growth
Standard Growth Factor Decomposition Analysis
(as Percentages of Total Output Growth)

in %

		Vietnam 1996-2000							Malaysia 1987-1991								Indonesia 1990-1995							
	Industry/Sector	IS	IO	DD1	DD2	DD3	EE	Total	IS	IO	DD1	DD2	DD3	DD4	EE	Total	IS	IO	DD1	DD2	DD3	DD4	EE	Total
1	Agriculture	3.1	-1.4	-0.5	0.0	1.0	3.2	5.3	-0.5	0.0	2.0	0.2	0.3	-0.2	2.0	3.7	-0.4	-1.3	7.1	0.0	0.5	0.5	0.7	7.2
2	Mining	-0.1	-1.1	0.1	0.0	0.9	15.9	15.6	-0.5	-0.7	0.3	0.0	0.4	0.1	2.4	2.1	0.1	0.9	0.7	0.0	1.5	0.4	1.0	4.5
	Primary Sector	2.9	-2.5	-0.4	0.0	1.9	19.1	21.0	-1.1	-0.8	2.3	0.2	0.8	-0.1	4.4	5.8	-0.2	-0.4	7.8	0.0	2.1	0.9	1.7	11.7
3	Oil Refinery																-0.4	-0.7	0.9	0.0	0.8	-0.1	-0.1	0.3
4	Food/Beverages/Tobacco	1.3	0.8	5.4	0.0	1.0	3.4	11.9	-1.0	0.3	1.6	0.1	0.1	0.1	3.1	4.3	-0.2	1.3	10.8	0.0	0.1	0.8	0.6	13.5
5	Textile/Wearing Apparel	1.2	1.3	2.8	0.0	0.0	11.2	16.6	-0.5	0.0	0.7	0.0	0.0	-0.1	2.2	2.4	0.4	-0.1	2.0	0.0	0.0	0.1	2.3	4.7
6	Wood products	-0.1	-1.5	0.0	0.0	0.3	0.1	-1.1	-0.2	-0.8	0.2	0.0	0.5	-0.4	2.5	1.8	0.0	0.0	0.5	0.0	0.7	0.1	0.6	1.9
7	Paper/Printing/Publishing	0.1	-0.3	1.0	0.0	0.1	0.2	1.1	-0.1	0.3	0.2	0.1	0.2	-0.1	0.9	1.4	0.1	0.2	0.6	-0.1	0.1	0.0	0.7	1.7
8	Chemical Products	2.0	0.3	1.3	0.0	0.7	1.0	5.4	-1.1	-0.1	1.8	0.3	0.6	-0.2	3.9	5.1	1.1	0.5	2.6	0.0	0.3	0.0	1.7	6.2
9	Non-metallic mineral products	0.5	0.0	0.0	0.0	1.8	0.2	2.5	-0.2	0.3	0.2	0.0	0.8	0.0	0.6	1.6	0.2	-0.1	0.1	0.0	0.6	0.0	0.1	0.9
10	Metal Products	2.1	-0.8	0.1	0.0	1.0	1.4	3.8	-0.8	1.1	0.5	0.0	1.3	0.1	2.5	4.9	0.1	-0.2	0.1	0.0	0.7	0.0	0.3	1.1
11	Machinery/Equipment	1.4	1.3	0.0	0.0	1.7	4.9	9.3	3.1	-0.1	2.0	0.1	4.3	0.3	20.6	30.2	0.9	-0.4	1.8	-0.1	1.3	0.0	2.0	5.6
12	Other Manufacturing	-1.8	0.7	-0.6	0.0	-0.1	1.5	-0.4	-0.8	0.0	0.0	0.0	0.0	0.0	2.3	1.6	0.1	0.0	0.2	0.0	0.0	0.0	0.2	0.5
	Secondary Sector	6.8	1.8	10.1	0.0	6.5	23.9	49.1	-1.5	1.1	7.2	0.5	7.8	-0.1	38.5	53.3	2.8	1.3	18.7	-0.2	3.9	1.0	8.5	35.9
13	Electricity/Gas/Water	-1.6	0.7	0.4	0.0	0.4	1.2	1.0	-0.1	0.2	0.8	0.2	0.3	0.0	0.8	2.2	0.0	-0.4	0.7	-0.1	0.1	0.0	0.2	0.5
14	Construction	0.0	-0.9	0.0	0.0	9.3	0.1	8.6	0.0	-0.1	0.3	0.1	6.5	0.0	0.2	7.0	0.0	0.6	0.4	-0.2	11.8	0.0	0.1	12.9
15	Trade	-6.0	5.9	4.4	0.0	1.6	7.5	13.4	0.0	0.4	3.7	0.2	3.0	0.3	4.4	11.9	-0.4	1.2	15.0	-0.1	1.4	0.1	2.9	20.1
16	Services	-2.0	-1.5	5.4	-0.2	0.8	4.5	7.1	0.3	0.4	8.8	4.5	1.8	0.0	3.9	19.8	-0.5	3.0	8.9	2.1	1.8	0.1	3.1	18.5
	Tertiary Sector	-9.6	4.2	10.2	-0.2	12.1	13.3	30.0	0.2	0.8	13.6	5.0	11.5	0.3	9.3	40.8	-0.8	4.5	25.0	1.7	15.2	0.2	6.3	52.0
	Total	0.1	3.5	19.9	-0.2	20.5	56.3	100.0	-2.4	1.2	23.1	5.8	20.1	0.1	52.2	100.0	1.3	4.6	52.4	1.5	22.0	1.9	16.4	100.0

Table 5.4

Sources of Output Growth
Extended Growth Factor Decomposition Analysis
(as Percentage of Total Output Growth)

Country	Sector	Primary	Secondary	Tertiary	Total
Vietnam	Primary	16.1	3.6	1.3	21.0
	Secondary	0.0	43.9	5.1	49.0
	Tertiary	2.0	4.1	23.8	29.9
	Total	18.2	51.6	30.2	100.0
Malaysia	Primary	2.7	1.8	1.3	5.8
	Secondary	0.5	48.7	4.2	53.3
	Tertiary	0.3	6.9	33.6	40.8
	Total	3.5	57.4	39.1	100.0
Indonesia	Primary	1.8	6.5	3.4	11.7
	Secondary	0.0	28.9	7.3	36.2
	Tertiary	0.2	4.8	47.0	52.0
	Total	2.0	40.2	57.8	100.0

Table 5.5

Sources of Output Growth
Extended Growth Factor Decomposition Analysis
(as Percentage of the Output Growth of Each Sector)

Country	Sector	Primary	Secondary	Tertiary	Total
Vietnam	Primary	76.9	17.0	6.2	100
	Secondary	0.0	89.6	10.4	100
	Tertiary	6.8	13.8	79.4	100
	Total	18.2	51.6	30.2	100
Malaysia	Primary	46.4	31.2	22.4	100
	Secondary	0.9	91.3	7.8	100
	Tertiary	0.7	17.0	82.3	100
	Total	3.5	57.4	39.1	100
Indonesia	Primary	15.7	55.1	29.2	100
	Secondary	0.0	79.8	20.2	100
	Tertiary	0.3	9.3	90.4	100
	Total	2.0	40.2	57.8	100

Appendix

Table A1

Sources of Output Growth for Malaysia, 1987-1991
Extended Growth Factor Decomposition Analysis
(as Percentage of Total Output Growth)

(in %)

	Industry/Sector	Primary	Secondary	Tertiary	Output Growth
1	Agriculture	2.1	0.9	0.7	3.7
2	Mining	0.7	0.9	0.6	2.1
	Primary	2.7	1.8	1.3	5.8
3	Food/Beverages/Tobacco	0.4	3.5	0.5	4.3
4	Textile/Wearing Apparel	0.0	2.4	0.0	2.4
5	Wood products	0.0	1.3	0.5	1.8
6	Paper/Printing/Publishing	0.0	1.0	0.4	1.4
7	Chemical Products	0.1	4.2	0.9	5.1
8	Non-metallic mineral products	0.0	0.8	0.8	1.6
9	Iron/Steel/Nonferrous metals	0.0	4.0	0.8	4.9
10	Machinery/Equipment	0.0	29.9	0.3	30.2
11	Other Manufacturing	0.0	1.6	0.0	1.6
	Secondary	0.5	48.7	4.2	53.3
12	Electricity/Gas/Water	0.0	0.8	1.3	2.2
13	Construction	0.0	0.1	6.9	7.0
14	Trade	0.1	3.9	7.9	11.9
15	Services	0.1	2.1	17.5	19.8
	Tertiary	0.3	6.9	33.6	40.8
	Total	3.5	57.4	39.1	100.0

Table A2

Sources of Output Growth for Malaysia, 1987-1991
Extended Growth Factor Decomposition Analysis
(as Percentage of the Output Growth of Each Industry or Each Sector)

(in %)

	Industry/Sector	Primary	Secondary	Tertiary	Output Growth
1	Agriculture	55.6	25.4	19.0	100
2	Mining	30.6	41.1	28.3	100
	Primary	46.4	31.2	22.4	100
3	Food/Beverages/Tobacco	8.2	80.5	11.3	100
4	Textile/Wearing Apparel	0.1	98.6	1.3	100
5	Wood products	0.3	72.1	27.6	100
6	Paper/Printing/Publishing	1.0	73.5	25.5	100
7	Chemical Products	1.4	81.5	17.1	100
8	Non-metallic mineral products	0.2	49.5	50.3	100
9	Iron/Steel/Nonferrous metals	0.2	83.0	16.9	100
10	Machinery/Equipment	0.1	99.0	1.0	100
11	Other Manufacturing	0.0	100.3	-0.3	100
	Secondary	0.9	91.3	7.8	100
12	Electricity/Gas/Water	1.0	38.6	60.4	100
13	Construction	0.1	2.0	97.9	100
14	Trade	0.9	32.5	66.6	100
15	Services	0.7	10.6	88.7	100
	Tertiary	0.7	17.0	82.3	100
	Total	3.5	57.4	39.1	100

Table A3

Sources of Output Growth for Indonesia, 1990-1995
Extended Growth Factor Decomposition Analysis
(as Percentage of Total Output Growth)

(in %)

	Industry/Sector	Primary	Secondary	Tertiary	Output Growth
1	Agriculture	-1.0	6.7	1.5	7.2
2	Mining	2.9	-0.3	2.0	4.5
	Primary	1.8	6.5	3.4	11.7
3	Oil Refinery	0.0	-1.2	1.5	0.3
4	Food/Beverages/Tobacco	0.0	12.4	1.2	13.5
5	Textile/Wearing Apparel	0.0	4.5	0.2	4.7
6	Wood Products	0.0	1.1	0.8	1.9
7	Paper/Printing/Publishing	0.0	1.1	0.5	1.7
8	Chemical Products	0.0	5.5	0.8	6.2
9	Non-Metallic Mineral Products	0.0	0.2	0.6	0.9
10	Iron/Steel/Non-Ferrous Metals	0.0	0.3	0.8	1.1
11	Machinery/Metal Products	0.0	4.5	1.0	5.6
12	Other Manufacturing	0.0	0.5	0.0	0.5
	Secondary	0.0	28.9	7.3	36.2
13	Electricity/Gas/Water	0.0	0.3	0.3	0.5
14	Construction	0.0	0.2	12.7	12.9
15	Trade	0.0	1.7	18.4	20.1
16	Services	0.1	2.7	15.6	18.5
	Tertiary	0.2	4.8	47.0	52.0
	Total	2.0	40.2	57.8	100.0

Table A4

Sources of Output Growth for Indonesia, 1990-1995
Extended Growth Factor Decomposition Analysis
(as Percentage of the Output Growth of Each Industry or Each Sector)

(in %)

	Industry/Sector	Primary	Secondary	Tertiary	Output Growth
1	Agriculture	-14.2	93.9	20.3	100
2	Mining	62.9	-6.2	43.4	100
	Primary	15.7	55.1	29.2	100
3	Oil Refinery	15.7	-412.1	496.4	100
4	Food/Beverages/Tobacco	-0.3	91.7	8.6	100
5	Textile/Wearing Apparel	0.1	96.6	3.3	100
6	Wood Products	0.1	59.1	40.9	100
7	Paper/Printing/Publishing	0.2	68.1	31.7	100
8	Chemical Products	-0.4	88.3	12.1	100
9	Non-Metallic Mineral Products	0.1	27.6	72.3	100
10	Iron/Steel/Non-Ferrous Metals	0.1	30.5	69.3	100
11	Machinery/Metal Products	0.3	80.9	18.8	100
12	Other Manufacturing	0.1	95.6	4.4	100
	Secondary	0.0	79.8	20.2	100
13	Electricity/Gas/Water	0.4	50.6	49.1	100
14	Construction	0.1	1.2	98.7	100
15	Trade	0.1	8.2	91.7	100
16	Services	0.8	14.8	84.4	100
	Tertiary	0.3	9.3	90.4	100
	Total	2.0	40.2	57.8	100